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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,956	08/28/2003	Fang F. Dong	12812.14373	1955
26946	7590	06/01/2005	EXAMINER	
JOSEPH S. HEINO, ESQ. 111 E. KILBOURN AVENUE SUITE 1400 MILWAUKEE, WI 53202			THOMAS, COURTNEY D	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No. 10/604,956	Applicant(s) DONG ET AL.	
	Examiner Courtney Thomas	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12-20, 23, 24, 26-28 and 31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12-20, 23, 24, 26-28 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 1-3, 5, 9, 13-17, 24 and 31 are objected to because of the following informalities:
2. Claims 1-3, 5, 9, 13-17, 24 and 31 contain reference characters corresponding to elements illustrated in submitted drawings. Examiner suggests these characters be enclosed by parenthesis to avoid confusion with other characters that appear in the claims (see MPEP 608.01 (m)). Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-9, 12-20, 23-24, 26-28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al. (U.S. Patent 6,466,645).

After selected steps of preprocessing, tube-spit detection is performed 106 on the sample. Such detection can be performed using many different methods, and one specific method is described below in more detail. Generally, the objective is to determine whether the x-ray source experienced a drop in power. Specifically, upon the occurrence of a tube-spit event, signals on the entire detector should experience a significant drop since the x-ray tube output is reduced to nearly zero. Therefore, a tube-spit condition can be detected by determining whether the x-ray tube output was reduced to nearly zero for a period of time.

5.

FIG. 3 is a flow chart illustrating tube-spit detection and correction processing 100 in accordance with one embodiment of the present invention. Such detection and correction are performed, for example, by a processor in DAS 32, image reconstructor 34, or computer 36. Rather than increas-

6.

(Top) Column 3, lines 29-39 (Bottom) Column 3, lines 10-14; U.S. Patent 6,466,645

7. As per claims 1 and 13, Hsieh et al. disclose a method (and processor) for detecting and correcting tube-spit events comprising the steps of monitoring a generator output from a CT system generator; determining whether a tube spit event occurred; and if a tube spit occurred, performing tube spit correction (see Abstract (not shown above); column 3, lines 12-14; 29-39; column 3, lines 48-54 (not shown above)). Examiner notes that the method for detecting tube-spit events also comprises the step of providing an X-ray controller (28) and computer (36). Additionally, Hsieh et al. is noted as not explicitly reciting a step of providing a CT system generator, however Hsieh et al. discloses that X-ray controller (28) serves as a means for providing power and timing signals to an X-ray source (column 2, lines 54-55). Artisans in the X-ray art would appreciate such disclosure as relating the disclosed X-ray controller and the recited CT system generator as functional equivalents. Examiner further notes that Applicants' disclosure (see para. 16 and Fig. 2) supports such functional similarity.

FIG. 4 is a flow chart illustrating an exemplary method for tube-spit detection processing 120. As explained above, many alternative methods can be used for such detection, including by measuring the current or voltage of the power supply to the x-ray tube. Sudden changes in either such current or voltage measurement is an indication of a tube-spit event.

8.

Column 3, lines 48-54 - U.S. Patent 6,466,645 to Hsieh et al.

9. **As per claims 2-4 and 14-16**, Hsieh et al. disclose a method (and processor) as recited in claims 1 and 13, but do not explicitly disclose a method comprising the step of monitoring either generator kV or mA waveforms; determining whether generator output dropped below a threshold value and if generator output falls below the threshold, declaring a tube-spit event.

10. Hsieh et al. teach the existence of alternate methods for detecting the occurrence of tube-spit events. In particular, Hsieh et al. teach that tube-spit events are often accompanied with sudden output changes, such as tube current or voltage. It would be appreciated by those having ordinary skill in the X-ray tube art that sudden changes represent data outside of normal operating parameters (threshold) – (column 3, lines 48-54 (above); see also column 3, lines 29-39).

11. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method (and processor) of Hsieh et al. such that the steps of detecting and correcting tube-spit events comprise: monitoring either generator kV or mA waveforms; determining whether generator output dropped below a threshold value and if generator output falls below the threshold, declaring a tube-spit event. One would have been motivated to make such a modification for the purpose of identifying anomalous tube-operating parameters (i.e. voltage or current) to correlate the occurrence of a tube spit event as suggested by Hsieh et al. (column 3, lines 48-54 (above); see also column 3, lines 29-39).

12. **As per claims 5-9 and 12**, Hsieh et al. as modified above, disclose a method (and processor) for detecting and correcting tube-spit events comprising the steps of determining corrupted views (144) storing history and magnitude of tube spit occurrences (Figs. 3 and 4), notifying operator of need to change generator (column 4, lines 45-51) and using interpolation

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between two good views to replace corrupted views (column 4, lines 52-67); wherein view

interpolation is performed in accordance with

$$P_{ij}(k+n) = \left(\frac{m-n}{m+1}\right)P_{ij}(k-1) + \left(\frac{n+1}{m+1}\right)P_{ij}(k+m) \quad 0 \leq n < m$$

(column 4, line 65).

13. **As per claims 17-20, 23-24, 26-28, and 31**, Hsieh et al. as modified above, disclose a method (and processor) for detecting and correcting tube-spit events comprising the steps of determining corrupted views (144) storing history and magnitude of tube spit occurrences (Figs. 3 and 4), notifying operator of need to change generator (column 4, lines 45-51) and using interpolation between two good views to replace corrupted views (column 4, lines 52-67); wherein view interpolation is performed in accordance with

$$P_{ij}(k+n) = \left(\frac{m-n}{m+1}\right)P_{ij}(k-1) + \left(\frac{n+1}{m+1}\right)P_{ij}(k+m) \quad 0 \leq n < m$$

(column 4, line 65).

Response to Arguments

14. Applicant's arguments with respect to claims 1-9, 12-20, 23-24, 26-28, and 31 have been considered but are moot in view of the new ground(s) of rejection. In particular, claim 1 has been amended to recite the limitation of "providing a CT system generator having a generator output." Examiner contends however, that the disclosure of Hsieh et al. (U.S. Patent 6,466,645) still anticipates the claimed method of detecting and correcting for tube-spit (events). Applicants counter this notion by providing the following points: a) Hsieh et al. does not explicitly disclose a sequence comprising a step of monitoring the generator output of a CT system generator; b) Hsieh et al. are concerned with X-ray tube output (and not CT system generator output) and c) Hsieh et al. teach a method of tube-spit detection through reconstruction processes. In response to Applicants' arguments, Examiner provides the following for consideration:

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15. Hsieh et al. recognize that tube spit events occur as a result of a temporary electrical short circuit that occurs within an X-ray tube (column 1, lines 33-34). Hsieh et al. subsequently teach that such an occurrence is related to a temporary interruption of power supplied to the tube. Hsieh et al., recognize and disclose several methods for detecting and identifying tube spit events; wherein alternate methods relate to monitoring power supply output (column 3, lines 29-39). As understood by the teaching of the reference, Hsieh et al. equate changes in X-ray tube output as synchronous with power changes supplied to the tube. Examiner recognizes that Hsieh et al. suggest a direct relationship between X-ray tube output and a corresponding power supply source. Examiner concludes therefore that Hsieh et al. anticipate the claimed method of monitoring power output or, as recited: "monitoring the generator output of a CT system generator." With regard to the "type" of monitoring (e.g. reconstruction process, detector changes, etc.) Examiner refers back to the teachings of Hsieh et al. (column 3, lines 29-39) wherein it is disclosed that the identification of tube-spit events is the recognition of power output changes. Claim 1 (and claim 13) as written, does not preclude the type of monitoring used to identify the sought after event.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Courtney Thomas whose telephone number is (571) 272-2496. The examiner can normally be reached on M - F (9 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Courtney Thomas **CT**
Examiner
Art Unit 2882



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER